1.	Title of the course	Ordinary Differential Equations
2.	Course number	MA511L
3.	Structure of credits	3-1-0-4
4.	Offered to	PG
5.	New course/modification to	Modification To MA5204/10
6.	To be offered by	Department of Mathematics and Statistics
7.	To take effect from	July 2022
8.	Prerequisite	Nil
9.	**Course Objective(s):** To introduce the ordinary differential equations (ODE) and their solvability. To explain the long term behavior, stability and nature of a well-defined model system at an unknown location at a future time using ODE.	
10.	**Course Content:** Existence and uniqueness, geometric interpretation of exact solutions of first order, orthogonal trajectories, Picardâ€™s theorem, iteration, Lipschitz condition, existence and uniqueness of initial value problem, non-local existence of solutions; Second order, general solution of homogeneous, non-homogeneous equations, Wronskian, variation of parameters, Sturm comparison and separation theorem, boundary value problem, Greenâ€™s functions, Sturm-Liouville problems, Euler-Cauchy equations, ordinary points, Frobenius series solutions, regular singular points, Legendre equation and polynomials, Bessel functions; System of ODE, properties of solutions of linear systems, eigenvalue, eigenvector, fundamental matrix solutions, matrix exponential; Applications, string vibration, Newtonâ€™s law, motion of charged particle, satellite orbiting a planet, Euler-Lagrange equations.	
11.	**Textbook(s):** 1. Coddington E A, *An Introduction to Ordinary Differential Equations*, Dover Publications (1989). 2. Ross S L, *Introduction to Ordinary Differential Equations*, Wiley (1980).	
12.	**Reference(s):** 1. Chicone C, *Ordinary Differential Equations with Application*, Springer (2006). 2. Collins P J, *Differential and Integral Equations*, Oxford University Press (2006). 3. Kreyszig E, *Advanced Engineering Mathematics*, Wiley (2011). 4. Simmons G F, *Differential Equations with Applications and Historical Notes*, McGraw-Hill Higher Education (2016).	